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EXAMINER	
EOFF, ANCA	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/557,694	HADA ET AL.	
	Examiner	Art Unit	
	Anca Eoff	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5 and 7-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-5 and 7-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/26/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The foreign priority documents JP 2003-160478, filed on June 5, 2003, JP 2003-428853, filed on December 25, 2003 and JP 2004-57449, filed on March 02, 2004 were received and acknowledged. However, in order to benefit of the earlier filing dates, certified English translations are required.

2. Claims 1, 3-5 and 7-21 are pending. Claims 2 and 6 are canceled.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17 provides for the use of the composition of claim 1 in a process of forming a resist pattern, but, since the claim does not set forth any steps involved in the process, it is unclear what process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claim 17 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 3-5, 7, 11-13, 16-17, 19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Przybilla et al. (SPIE, Volume 1672 Advances in Resist Technology and Processing IX, 1992).

With regard to claims 1, 3 and 19, Przybilla et al. disclose a resin for photoresist composition having a – $C(CF_3)_2OH$ group incorporated in aromatic monomers and polymers (par. 2 on page 501 and table 3 on page 506).

This group meets the limitations of claims 1 and 3, because the hydroxyl group – OH is bonded to a carbon atom at polymer terminals, wherein the carbon atom has in α-position to said hydroxyl group two electron attractive groups $-CF_3$ (trifluoromethyl).

With regard to claim 4, Przybilla et al. further disclose that the resins require 30-40 mol % of 2- HHFIP (2-hydroxyhexafluoroisopropyl group) in the polymer to deliver the appropriate alkaline solubility (par. 2.1 on page 501).

With regard to claim 5 and 21, Przybilla et al. disclose a resin for photoresist composition having a – $C(CF_3)_2OH$ group incorporated in aromatic monomers and polymers (par. 2 on page 501 and table 3 on page 506).

The -$C(CF_3)_2OH$ group meets the limitations of claims 5 and 21, having the same structure as the preferred -CR_1R_2OH group disclosed on page 20 of the instant application, where R_1, R_2 can be independently an alkyl group, a halogen atom, a halogenated alkyl group and at least one of R_1 and R_2 is an electron attractive group selected from the group consisting of halogen atoms and halogenated alkyl groups.

In this case, R_1, R_2= - CF_3 (trifluoromethyl).

Absent a record to prove the contrary, the -$C(CF_3)_2OH$ group has a pKa value within a range from 6 to 12 (MPEP 2112.01 II).

With regard to claim 7, Przybilla et al. further disclose that the 2-HHIP (2-hydroxyhexafluoroisopropyl) group can be esterified with di-tertbutyl dicarbonate exactly as a phenolic group, creating a functional group deprotection (t-BOC) type photoresist.The use of a 50% protected homopolymer results in a resist material with high contrast and high density (par.2.2 and 2.3 on pages 502, 503).

With regard to claims 11-13, Przybilla et al. further disclose a dissolution inhibition type photoresist material containing modified styrene with 40 mol % HHIP (2-hydroxyhexafluoroisopropyl) moieties, 2,2-bis (4-(2-tert-butyloxycarbonyloxy-

hexafluoroisopropyl)-styrene and triphenylsulfonium triflate as acid generator (par.2.3 on pages 502 and 503).The triflate (trifluoromethane sulfonate, CF_3-SO_3^-) anion meets the limitations of claim 13.

The modified styrene with 40 mol % HHIP (2-hydroxy-hexafluoroisopropyl) moieties meets the limitations of claim 1, since the hydroxyl group –OH is bonded to a carbon atom at polymer terminals, wherein the carbon atom has in α-position to said hydroxyl group two electron attractive group $-CF_3$ (trifluoromethyl) (chemical formula of HHIP modified styrene appears in table on page 506).

With regard to claim 16, Przybilla et al. further disclose that the photoresist may comprise nitrogen-containing organic compounds, such as hexamethoxymethylmelamine as a crosslinker (par.2.4 on page 503).

With regard to claim 17, Przybilla et al. further disclose a process of forming a line & space resist pattern using a photoresist comprising poly (4-(2-tertbutyloxy-carbonyloxy-hexafluoroisopropyl)styrene-co-4-(2-hydroxyhexafluoroisopropyl)styrene). The process comprises a pre-bake step, exposure step, post-exposure bake and development (picture 1 on page 510).

9. Claims 1, 3, 5, 7-13, 16 -17, 19 and 21 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pawlowski et al. (US 6,358,665).

With regard to claims 1, 3, 5, 19 and 21, Pawlowski et al. disclose a radiation sensitive composition containing a homopolymer or copolymers of a hydroxystyrene resin with other monomers.

Pawlowsky et al. clearly disclose preferred monomers usable herein including 3-(2-hydroxy-hexaflouoropropyl-2) styrene and 4-(2-hydropxy-hexafluoropropyl-2)-styrene (column 13, line 30-column 14, line 3).

In the alternative, it would have been obvious to select 3-(2-hydroxy-hexaflouoropropyl-2) styrene and 4-(2-hydropxy-hexafluoropropyl-2)-styrene as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 30-column 14, line 3).

The substituents in the 3-(2-hydroxy-hexaflouoropropyl-2) styrene and 4-(2-hydropxy-hexafluoropropyl-2)-styrene meet the limitations of claims 1-3, because the hydroxyl group –OH is bonded to a carbon atom at polymer terminals, wherein the carbon atom has in a-position to said hydroxyl group two electron attractive groups $-CF_3$ (trifluoromethyl).

The 2-hydroxy-hexaflouoropropyl group meets the limitations of claims 5 and 21, having the same structure as the preferred $-CR_1R_2OH$ group disclosed on page 20 of the instant application, where R_1, R_2 can be independently an alkyl group, a halogen atom, a halogenated alkyl group and at least one of R_1 and R_2 is an electron attractive group selected from the group consisting of halogen atoms and halogenated alkyl groups. In this case, R_1, R_2= - CF_3 (trifluoromethyl).

Absent a record to prove the contrary, the $-C(CF_3)_2OH$ group has a pKa value within a range from 6 to 12 (MPEP 2112.01 II).

With regard to claim 7, Pawlowski et al. further disclose that the hydroxystyrene-based resin is made alkali-soluble by protecting alkali-soluble groups on the resin with an acid cleavable protecting group(acid dissociable, dissolution inhibiting group) and disclose a variety of protective groups that could protect the phenolic hydroxyl groups and the carboxyl groups in the copolymer (column 14, lines 4-41).

With regard to claim 8, Pawlowski et al. clearly teach that the hydroxystyrene copolymers can also comprise as other monomer (meth)acrylic acid and its derivatives (such as methyl acrylate or methyl methacrylate) (column 13, lines 30-50).

In the alternative, it would have been obvious to select (meth)acrylic acid and its derivatives as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 30-50).

Examples of hydroxystyrene based resins suitable for VDUV (193 nm) applications include co- or terpolymers of (meth)acrylates with acid-cleavable protective groups (column 14, lines 51-54). One specific example shows that 2-methyl-2-adamantyl methacrylate (2-methyl-2-adamantyl is a protective group, in accordance to column 14, lines 25-39) and mevalonic lactone methacrylate can be used as co-monomers in the hydroxystyrene-based resin (column 45, lines 28-29).

With regard to claim 9, Pawlowski et al. clearly teach that other preferred co-monomers are 4-hydroxyphenyl (meth)acrylate, 3-hydroxyphenyl(meth)acrylate, 2-hydroxyphenyl (meth)acrylate (column 13, lines 59-63).

In the alternative, it would have been obvious to select 4-hydroxyphenyl (meth)acrylate, 3-hydroxyphenyl(meth)acrylate, 2-hydroxyphenyl (meth)acrylate as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 59-63).

With regard to claim 10, Pawlowski et al. further disclose that the resin have molecular weights in the range 2,000 to 20,000 (column 16, lines 27-28), with particular examples where the styrene-based resin has molecular weights under 12,000 (column 65).

With regard to claim 11, Pawlowski et al. further disclose chemically amplified radiation sensitive compositions comprising the hydroxystyrene-based resins (abstract).The resins comprise a homopolymers or copolymers of a hydroxystyrene resin with other monomers.

Pawlowski clearly teaches that two of the preferred monomers usable herein include 3-(2-hydroxy-hexaflouoropropyl-2) styrene and 4-(2-hydropxy-hexafluoropropyl-2)-styrene (column 13, line 30-column 14, line 3).

In the alternative, it would have been obvious to select 3-(2-hydroxy-hexaflouoropropyl-2) styrene and 4-(2-hydropxy-hexafluoropropyl-2)-styrene as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 30-column 14, line 3).

With regard to claims 12 and 13, Pawlowski et al. further disclose that the chemically amplified radiation sensitive composition comprises an acid generator, which is an onium salt (abstract).The onium salt has the formula $Y^+ ASO_3^-$, where A represents

CF_3-CHF-CF_2- or CF_3-CF_2-CF_2-CF_2 – (fluorinated alkyl groups) (abstract).These fluoroalkylsulfonate anions meet the limitations of claim 13.

With respect to claim 16, Pawlowski et al. further disclose that the chemically amplified radiation sensitive composition comprises nitrogen-containing compounds, such as urea and melamine derivatives as crosslinking agents (column 17, lines 46-48).

With respect to claim 17, Pawlowski et al. further disclose that the chemically amplified radiation sensitive composition is used as a photoresist in applications where the composition is coated on various substrates, and the coated substrates are exposed to render latent images alkali soluble or alkali insoluble, followed by rinsing with an alkali to form predetermined patterns on the substrates (column 19, line 65-column 20, line 4).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pawlowski et al. (US Patent 6,358,665) as applied to claim 12 and further in view of Lamanna et al. (US Patent 5,554,664).

Pawlowski et al. disclose chemically amplified radiation sensitive compositions comprising the hydroxystyrene-based resins and an acid generator, which is an onium salt (abstract), as applied to claim 12. The resins comprise a homopolymers or

copolymers of a hydroxystyrene resin with other monomers. Pawlowski clearly teaches that two of the preferred monomers usable herein include 3-(2-hydroxy-hexaflouoropropyl-2) styrene and 4-(2-hydropxy-hexafluoropropyl-2)-styrene (column 13, line 30-column 14, line 3).

Pawlowski et al. disclose that the acid generator is an onium salt and has the formula $Y^+ ASO_3^-$, where A represents CF_3-CHF-CF_2- or CF_3-CF_2-CF_2-CF_2 – (fluorinated alkyl groups) (abstract) and can be used in combination with other photoacid generators, such as anionic sulfonium salts (column 12, line 18). The onium salt of formula $Y^+ ASO_3^-$ above is equivalent to the acid generator (b0) of claim 15 of the instant application.

However, Pawlowski et al. fail to teach the use of sulfonium salts of bis sulfonyl imide as acid generators.

Lamanna et al. disclose the use of bis(highly fluorinated alkyl)sulfonylimide as energy-sensitive (e.g.thermal, radiation or photosensitive) initiator. These compounds have improved solubility in organic solvents, exhibit minimal corrosiveness when coating and adhesives are prepared using the compounds, generate highly reactive initiator, curative and/or catalyst upon activation by energy (abstract).

Lamanna et al. disclose that the cationic portion of the catalysts and initiators includes organic onium cations such as triarylsulfonium, wherein "aryl" is defined as an unsubstitued or substituted aromatic moiety having up to four independently selected substituents (column 5, lines 46- 51). The anionic portion includes fluorinated (highly fluorinated and perfluorinated) bisalkyl or aryl-sulfonylimide (column 6, lines 63-67).

Specific examples of anions are: $(C_2F_5SO_2)_2N^-$, $(C_4F_9SO_2)_2N^-$, $(CF_3SO_2)_2N^-$, $(CF_3SO_2)(C_4F_9SO_2)N^-$ (column 7, lines 45-49).

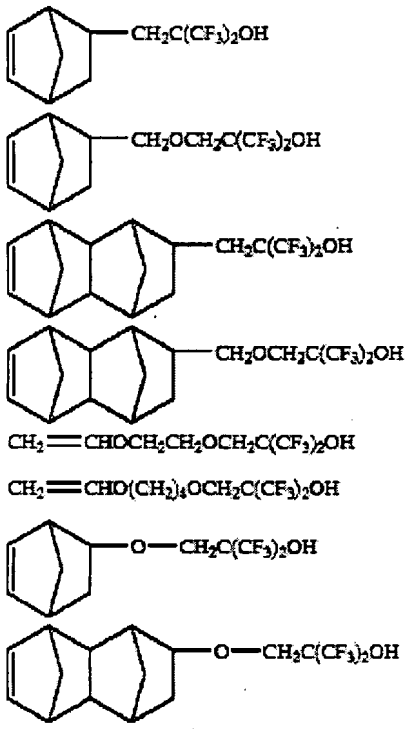
The compounds disclosed by Lamanna correspond to the acid generator (b2) of claim 14 of the instant application, where Y,Z are fluorinated methyl, ethyl or butyl groups and R_1, R_2, R_3 are aryl groups.

It would have been obvious for one of ordinary skill in the art at the time of the invention to use one of the of bis(highly fluorinated alkyl)sulfonylimide initiators of Lamanna et al. in the chemically amplified radiation sensitive compositions disclosed by Pawlowski et al., in order to take advantage of the properties of the initiator (good solubility in organic solvents, minimal corrosiveness when coating and adhesives are prepared using the compounds, generate highly reactive initiator upon activation by energy (Lamanna - abstract).

12. Claims 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feiring et al. (US Pg-Pub 2005/0203262).

With regard to claims 18 and 20, Feiring et al. disclose a fluorinated polymer useful in photoresist compositions, said fluorinated comprising a first repeating unit (a) derived from an ethylenically unsaturated compound containing a functional group having the structure $-X_f(CH_2)_q$ C $(R_f)(R_f')OH$, wherein R_f and R_f' are the same or different C $_{1\text{-}10}$ fluoroalkyl groups (par.0010-0015). R_f and R_f' must be sufficiently fluorinated to impart acidity to the hydroxyl (-OH) of the corresponding fluoroalcohol functional group, which needs to have a pKa value of 5-11.

Specific examples of co-monomer containing a fluoroalcohol functional group are given below (par.0075):



This repeating unit (a) is equivalent to the first structural unit comprising – CR_1R_2OH group bonded at the polymer terminal of the instant application, where R_1, R_2 are $C_{1\text{-}10}$ fluoroalkyl groups, preferably $-CF_3$ groups (as shown in the examples given above).

While Feiring et al. disclose polymers comprising the NB-F-OH as repeating unit (a) in amount between 37- 48 % (see examples in par.0173-0177), Feiring et al. also teach that the number of fluoroalcohol groups is determined for a given composition by optimizing the amount needed for good development in aqueous alkaline developer (par.0072).

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed waste water treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

(MPEP 2144.05 II Optimization of Ranges)

As shown by Feiring et al. in par.0072, the amount of fluroalcohol group-comprising repeating units is a result-effective variable and therefore optimizable.

Response to Arguments

13. Applicant's arguments filed on August 24, 2007 have been fully considered but they are not persuasive for the reasons stated below:

One page 5 of the Remarks, the applicant ~~is~~ has stated that 2- HHFIP (2-hydroxyhexafluoroisopropyl group) group of Przybilla et al. does not read on the structure $-CR_1R_2OH$ of the amended claim 1, where R_1 and R_2 each independently represent an alkyl group, a halogen atom or a halogenated alkyl group. The 2- HHFIP (2-hydroxyhexafluoroisopropyl group) is equivalent to the $-CR_1R_2OH$ group of the amended claim 1, where R_1 and R_2 are both $-CF_3$ groups (electron attractive

halogenated alkyl groups). On page 5, lines 16-19 of the specification of the instant application it is disclosed that trifluoromethyl groups ($-CF_3$) are preferred as R_1, R_2.

On pages 6-7 of the Remarks, the applicant stated that the 2-hydroxyhexafluroisorpopyl group of Pawlowski et al. does not read the structure - CR_1R_2OH of the amended claim 1, where R_1 and R_2 each independently represent an alkyl group, a halogen atom or a halogenated alkyl group. The 2-hydroxyhexafluoroisopropyl group is equivalent to the $-CR_1R_2OH$ group of the amended claim 1, where R_1 and R_2 are both $-CF_3$ groups (electron attractive halogenated alkyl groups). On page 5, lines 16-19 of the specification of the instant application it is disclosed that a trifluoromethyl groups ($-CF_3$) are preferred as R_1, R_2.

On page 7 of the Remarks, the applicant stated that Pawlowski et al. merely teach that a hydroxyl group in a polymer is alkali soluble and is protected by an alkali dissolution inhibiting group and changes from being alkali insoluble to alkali soluble by cleavage of the protected alkali soluble group under the action of an acid. However, this feature is clearly described by Pawlowki et al. under "chemically amplified radiation sensitive composition of positive-working type" in column 12, lines 61-67.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AE

Cynthia H Kelly